pong™

August 16, 2012

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20054

**Re: WT Docket 03-137/*Proposed Updates to Commission Testing Guidelines Regarding Human Exposure to Radiofrequency Electromagnetic Energy***

Dear Ms. Dortch:

The Federal Communications Commission (the "Commission") in "Bulletin 65"[1] intended to effect a testing regime (in connection with the equipment authorization process) that replicates consumers' actual experiences and behaviors vis-à-vis portable devices. The Commission has so stated: "For purposes of evaluating compliance with localized [Specific Absorption Rate or] SAR guidelines, portable devices should be tested or evaluated based on *normal operating positions or conditions*."[2]

The United States General Accounting Office (the "GAO") has recently issued a report[3] calling for the Commission to update its cell phone radiation exposure and testing guidelines. According to the GAO Report, the current standards—in place since 1997 (some 4 years before the first smartphones became commercially available)—"may not reflect the latest research," "may not identify maximum exposure [to radiation] in all possible usage conditions," and, notably, do not test for use of phones against the body—which *"could result in RF energy exposure higher than the FCC limit*."[4] These phenomena might particularly impact the Commission's current SAR testing guidelines, insofar as they relate to radiation absorption by children and other vulnerable populations.

In this letter, Pong Research Corporation ("Pong") explicates these notions of "**Real SAR**"—the SAR actually experienced by consumers using portable devices under *"normal operating positions or conditions."*[5] Pong also provides further information on the suitability of the

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[1] In re Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Release No. 96-326, 11 F.C.C.R. 15123, 15124 (1996).

[2] Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, edition 97-01, August 1997, at page 42 (emphasis added), http://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf. The Commission adopted the current radio frequency ("RF") radiation exposure standards that establish a maximum SAR of 1.6 watts per kilogram (1.6 W/kg) for spatial peak SAR as averaged over any 1 gram of tissue. *See* 47 C.F.R. §2.1093(d)(2). All portable wireless devices marketed, distributed, or sold in the United States must comply with this limit.

[3] GAO Report, *Exposure and Testing Requirements for Mobile Phones Should Be Reassessed*, GAO-12-771, July 2012, http://www.gao.gov/assets/600/592901.pdf ("GAO Report").

[4] *Id*.

[5] Bulletin 65, at page 42.

Commission's current SAR testing guidelines, relative to the real absorption of RF radiation by children. Finally, we urge changes to the Commission's web site consistent with the GAO Report and other recent developments, in order properly to inform consumers of the potential health effects of electro-magnetic radiation ("EMR") exposure. A copy of this letter is filed in the Commission's WT Docket No. 03-137.

## I. Measuring "Real SAR"

As discussed in Pong's prior filings,[6] most consumers today rely on their devices, using and carrying them in their clothing and against their heads and bodies, for longer periods than ever before—indeed even sleeping with them[7]--such that "body worn configuration" has become not the exception but the norm.

As discussed in Pong's filing dated June 29, 2012[8], certain testing guidelines in Bulletin 65 that account for accessories not provided by the portable device manufacturer itself—i.e., to test with a separation distance of 1.5 cm to 2.5 cm for body worn operation and in certain fixed positions for head proximity—do not accurately identify actual RF energy exposure experienced by consumers. Among other reasons, consumers do not typically keep their devices between 1.5 cm and 2.5 cm from their bodies or in fixed positions relative to their heads, but rather *against* them. As such, testing a device 15 mm or more away from the person (for body worn configuration) does not accurately reflect "real SAR."

The GAO Report similarly noted that current testing guidelines do not include testing against the body. It stated:

> *"By not formally reassessing its current limit, FCC cannot ensure it is using a limit that reflects the latest research on RF energy exposure. FCC has also not reassessed its testing requirements to ensure that they identify the maximum RF energy exposure a user could experience.* ***Some consumers may use mobile phones against the body, which FCC does not currently test, and could result in RF energy exposure higher than the FCC limit."***[9]

To shed light on this point, Pong tested a bare iPhone 4 (i.e., without a case) in controlled laboratory conditions that simulate EMR exposure *against* the body. (See **Figure 1**.) Testing evidenced a ***SAR measurement of 4.6 W/kg, well in excess of the FCC's safety standard of 1.6 W/kg.*** In fact at 3 mm from the body, the device still exceeded the Commission's SAR limit.

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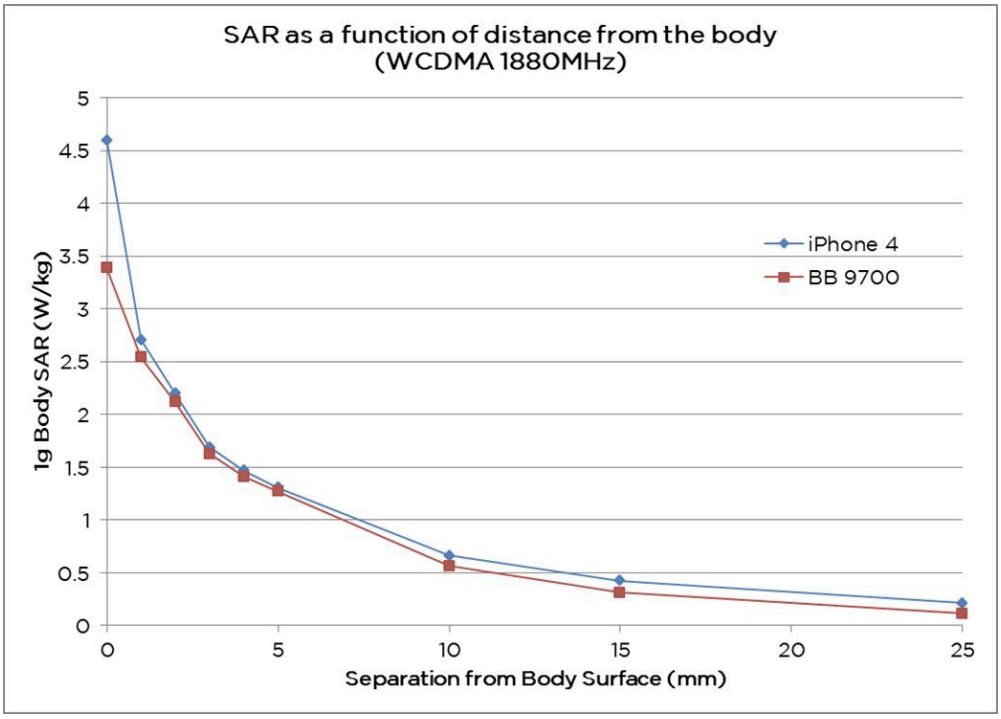
[6] *See, e.g.,* filing of Pong dated 5/31/2012 in WT Docket 11-186, http://apps.fcc.gov/ecfs/document/view?id=7021921006.
[7] See http://www.digitalbuzzblog.com/infographic-how-adults-are-using-mobile-phones and http://www.time.com/time/health/article/0,8599,1658166,00.html.
[8] Filing of Pong dated June 29, 2012 in WT Docket 11-186 and ET Docket 03-137, http://apps.fcc.gov/ecfs/document/view?id=7021981415. *See especially* footnote 10.
[9] GAO Report, *Highlights* section, emphasis added.

Results were to the same effect for a BlackBerry 9700—shown below in comparison to the iPhone 4, with ***SAR at 3.4 W/kg when measured against the body***.

**Figure 1. SAR Results for iPhone 4 and BB 9700 at Distances 0—25 mm at WCDMA 1880 MHz**




Consumers who use certain devices[10] directly against their bodies, then, might continuously experience EMR exposure at levels well in excess of the Commission's SAR safety limit of 1.6 W/kg. We hope that other commenters in the Commission's forthcoming notice of inquiry proceeding on cell phone safety will similarly conduct testing to shed as much light as possible on the "real SAR" resulting from the use of portable devices.

"Real SAR" from a device when measured against the body may be so high that use of a SAR-reducing case by itself may not ensure reduction of SAR below 1.6 W/kg for all phones at every spectrum band when measured at 0 mm distance from the body. We believe, however, that testing methodologies should ultimately examine the biological effects of radiation (SAR limits measure only the thermal or heating properties of devices), and encourage the Commission to inform consumers how to exercise precautions and achieve the lowest possible radiation exposures in every instance—whatever the regulatory standard.

We respectfully submit that, in order properly to protect consumers, the Commission should update its testing guidelines to include the use of devices directly against the body rather than at

[10] Pong tested only selected devices at the frequencies indicated.

between 15 mm and 25 mm away.[11] Most consumers hold their devices against their bodies and heads. A space of at least 15 mm or more dramatically reduces SAR, but that is not how consumers typically—or, in the Commission's words, as a matter of *"normal operating positions or conditions"*[12]—use devices. Modern habits tend towards much closer proximities, as well as longer exposures.[13]

## II. The Commission Should Update its SAR Testing Guidelines to More Accurately Account for Use of Wireless Devices by Children

The Commission's current SAR standards do not reflect the general population and, in particular, do not account accurately for the use of cell phones by children. Leading researcher Om P. Gandhi has noted:

> *"[T]he existing cell phone certification process uses a plastic model of the head called the Specific Anthropomorphic Mannequin (SAM), representing the top 10% of U.S. military recruits in 1989 and greatly underestimating the [SAR] for typical mobile phone users, especially children . . . ."*[14]

Children are more susceptible to absorption of EMR than are adults. The SAR for a 10-year old child is up to 153% higher than the SAR for the SAM model. Gandhi noted the following:

> *"[RF] exposure to a head smaller than SAM will absorb a relatively higher SAR. Also, SAM uses a fluid having the average electrical properties of the head that cannot indicate differential absorption of specific brain tissue, nor absorption in children or smaller adults. The SAR for a 10-year old is up to 153% higher than the SAR for the SAM model. When electrical properties are considered, a child's head's absorption can be over two times greater, and absorption of the skull's bone marrow can be ten times greater than*

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[11] *Cf.* Filing of Pong Research Corporation dated June 29, 2012 in WT Docket 11-186 and ET Docket 03-137, http://apps.fcc.gov/ecfs/document/view?id=7021981417 (addressing distance standards).

[12] Bulletin 65, at page 42.

[13] It should also be note that operating instructions from leading device manufacturers warn users to not use cell phones close to the body. One leading manufacturer even states that *SAR may exceed allowable limits* when cell phones are held close to the body—precisely how most consumers use cell phones. The following text appears in the user "operating instructions" that the Commission approves for devices of two leading device manufacturers, in connection with the Commission's equipment authorization process:

> "*iPhone's SAR measurement may exceed the FCC exposure guidelines for bodily worn operation if positioned less than 15 mm (5/8 inch) from the body . . . . When using iPhone near your body for voice calls or for wireless data transmission over a cellular network, keep iPhone at least 15 mm away from the body…*"
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> "*Keep the [BlackBerry] device at least 0.98 inches (25mm) from your body when the [device] is turned on and connected to a wireless network. When using any data feature of the Blackberry device . . . keep the device at least 0.98 inches from your body.*"

[14] Gandhi, O.P. et al., *Exposure Limits: The Underestimation of Absorbed Cell Phone Radiation, Especially in Children*, Electromagnetic Biology and Medicine, Early Online, 1-18 (2011).

*adults.*[15]

Gandhi proved this fact graphically[16] in **Figure 2**.

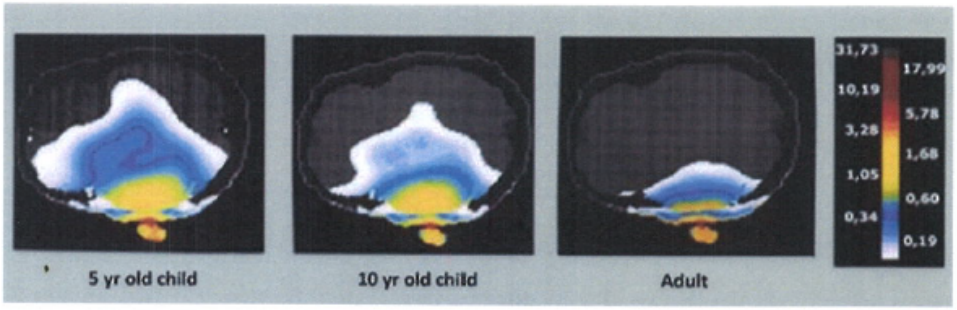


**Figure 2.** This figure shows SAR distributions for an adult male typical of SAM, a 10-year old child, and a 5-year old child—on the scale shown.

Frequency = 900 MHz

A February 2012 publication by Environment and Human Health, Inc., *Cell Phone – Technology, Exposures, Health Effects*, likewise noted the following:

> *"The model used to estimate the SAR for a cell phone user's head was derived from the size and dimensions of the head of a large adult male. A comparison of anatomically based models of the human head shows that this SAR may underestimate the absorption rate in children by a factor of two or more. Studies show deeper penetration of absorbed energy in a child's head, the result of the thinness of the outer ear and skull of young children.*
>
> *"Experiments have shown that smaller head models produce statistically higher SAR values than larger models. The National Academy of Sciences (NAS) notes that better characterization of SARs for children of various age groups is necessary and that current models are not adequate for children."*[17]

Seven out of 10 children in the United States aged 10 to 14 have cell phones, and one in three teens sends more than 3,000 texts per month.[18] A number of phone models are specifically marketed to children.

We respectfully suggest, therefore, that in order to best ensure protection of children, the Commission's forthcoming notice of inquiry on cell phone safety should inquire what would be an appropriate testing methodology that would—among other things—more accurately measure "real SAR" as it relates to use of wireless devices by children.

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[15] *Id.*, at page 11.
[16] *Id.*
[17] *Cell Phone – Technology, Exposures, Health Effects*, published by Environment and Human Health, Inc., February 2012, at page 47, http://www.ehhi.org/reports/cellphones/cell_phone_report_EHHI_Feb2012.pdf.
[18] *Id.*, at page 19.

## III. The Commission Should Revise its Web Site so that it Does Not Affirmatively Inform Consumers that Cell Phones are "Safe"

The Commission's web site states:

> *"Working closely with federal health and safety agencies, such as the Food and Drug Administration (FDA), the FCC has adopted limits for safe exposure to radiofrequency (RF) energy. These limits are given in terms of a unit referred to as the Specific Absorption Rate (SAR), which is a measure of the amount of radio frequency energy absorbed by the body when using a mobile phone. The FCC requires cell phone manufacturers to ensure that their phones comply with these objective limits for safe exposure.* ***Any cell phone at or below these SAR levels (that is, any phone legally sold in the U.S.) is a "safe" phone, as measured by these standards****. The FCC limit for public exposure from cellular telephones is an SAR level of 1.6 watts per kilogram (1.6 W/kg)."*[19]

According to the GAO Report, the current FCC standards—in place since 1997 (some 4 years before the first smartphones became commercially available*)—"may not reflect the latest research,"*[20] *"may not identify maximum exposure [to radiation] in all possible usage conditions,"*[21] and, notably, do not test for use of phones against the body. The GAO Report states: *"Some consumers may use mobile phones against the body, which FCC does not currently test, and could result in RF energy exposure higher than the FCC limit."*[22]

Consumers who use certain devices directly against their bodies, then, might continuously *and unknowingly* experience EMR exposure at levels well in excess of the Commission's SAR safety limit of 1.6 W/kg. (As noted above, Pong's internal tests have confirmed such excessive exposure.) In spite of the GAO's conclusions as well as other developments, the Commission's web site still informs consumers that cell phones—tested by these very same standards—are *"safe."* The statement is not only logically circuitous (insofar as it relies on standards that the GAO has suggested should be updated) but also confusing—as its use of quotation marks around the word *"safe"*[23] changes its plain meaning.

In addition to issues raised in the GAO Report regarding proximity of a device to the body during testing, the GAO Report also noted the lack of certainty with respect to health effects of cell phones: *"FDA stated that while the overall body of research has not demonstrated adverse health effects, some individual studies suggest possible effects."*[24] With respect to potential health impact from cell phone use, the GAO Report stated *"the research is not conclusive because findings from some studies have suggested a possible association with certain types of*

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[19] http://www.fcc.gov/encyclopedia/specific-absorption-rate-sar-cellular-telephones (emphasis added).
[20] GAO Report, *Highlights* page.
[21] *Id.*
[22] *Id.* Further, the *GAO Report* states on page 26, that *"Some consumer groups noted that they would like FCC to mention IARC's recent classification of RF energy exposure as 'possibly carcinogenic' on FCC's website."*
[23] See http://www.fcc.gov/encyclopedia/specific-absorption-rate-sar-cellular-telephones.
[24] *Id.*, at page 6.

*tumors, including cancerous tumors."*[25] The GAO Report further stated that FDA and others maintain the conclusion that "*insufficient information was available to conclude mobile phones posed no risk*."[26] This fact would appear to contradict an affirmative designation that cell phones are "safe."[27] The lack of certainty with respect to the health effects of cell phones further supports the need for the Commission to revise its web site in order better to inform consumers.

We suggest that a more supportable and protective consumer notification would indicate that: (a) the Commission established guidelines that it believes were suitable given the available data at the time; (b) the Commission expects to commence an inquiry that, among other things, will examine whether changes need to be made to the Commission's testing regime; and (c) in the interim, consumers should at all times exercise caution with respect to use of cell phones.

***Conclusion***

The Commission's testing guidelines aim to protect the safety and welfare of consumers, including children. To safeguard the continued integrity of the testing regime that underlies the equipment authorization process, and properly to promote consumers' safety and welfare, the Commission should—consistent with the purposes of Bulletin 65—update its testing guidelines more accurately to reflect predominant consumer behavior. Testing guidelines should be updated to reflect use of devices directly against the body rather than at least 15 mm away.

In addition, testing methodology, including SAM specifications, should be modified more closely to simulate the physiological characteristics of children, in order better to measure their potential SAR exposures.

Until further study is completed and the Commission's testing guidelines are updated, however, the Commission should *not* affirmatively inform consumers that cell phones are "safe" or safe. We respectfully proffer that it is no longer empirically supportable given the scientific uncertainty, nor sound from a consumer protection perspective, to notify consumers that cell phones are safe according to Commission standards (which themselves require updating).

The Commission should implement testing standards that reflect "real world" usage patterns, protect vulnerable populations such as children, consider the biological effects of radiation in testing methodology, and encourage and inform consumers on how to exercise precautions and achieve the lowest possible radiation exposures. By updating its testing guidelines and providing more information to consumers, the Commission can continue to promote consumer safety, consumer awareness, and wireless service quality.

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[25] *Id*., at page 8.
[26] *Id*., at page 6.
[27] Further, and again in apparent contradiction to the GAO's conclusion that "*insufficient information was available to conclude mobile phones posed no risk*," on June 15, 2012 various press sources reported that an FCC spokesperson stated, ""We are confident that, as set, the emissions guidelines for devices *pose no risks to consumers*." [Emphasis added]

Thank you for your consideration of these matters.

Sincerely,

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Pong Research Corporation

cc: Doron Gorshein
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